RECOMMENDATIONS AND GAPS FOR USES OF SOCIO-ECONOMIC INDICATORS ON THE ENVIRONMENTAL IMPACT OF FISHING ACTIVITIES

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INDECO

DEVELOPMENT OF INDICATORS OF ENVIRONMENTAL PERFORMANCE OF THE COMMON FISHERIES POLICY

Project no. 513754

INDECO

Development of Indicators of Environmental Performance of the Common Fisheries Policy

Specific Targeted Research Project of the Sixth Research Framework Programme of the EU on 'Modernisation and sustainability of fisheries, including aquaculture-based production systems', under 'Sustainable Management of Europe's Natural Resources'

RECOMMENDATIONS AND GAPS FOR USES OF SOCIO-ECONOMIC INDICATORS ON THE ENVIRONMENTAL IMPACT OF FISHING ACTIVITIES

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[Final]

The INDECO project

The purpose of this Co-ordination Action is to ensure a coherent approach to the development of indicators at EU level, in support of environmental integration within the CFP and in the context of international work on indicators. The principal objectives of INDECO are:

1. to identify quantitative indicators for the impact of fishing on the ecosystem state, functioning and dynamics, as well as indicators for socio-economic factors and for the effectiveness of different management measures;
2. to assess the applicability of such indicators; and
3. to develop operational models with a view to establishing the relationship between environmental conditions and fishing activities.

A consortium of 20 research organisations from 11 EU Member States is implementing INDECO. An Advisory User Group will provide a link between the researchers and policy makers, managers and stakeholders.

More information on INDECO can be found on the project's website:

http://www.ieep.org.uk/research/INDECO/INDECO_home.htm

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1 SUMMARY OF THE INDECO APPROACH TO DEVELOP INDICATORS OF ENVIRONMENTAL PERFORMANCE OF THE CFP

1.1 Objectives of INDECO

INDECO originated in response to a European Commission need. Financing is drawn from a budget line under FP6 for Specific Support to Policy. The budget is to finance scientific support that is targeted on and responsive to policy needs. In the specific case of the INDECO project the Terms of Reference state that:

> The purpose of this Co-ordination Action is to ensure a coherent approach to the development of indicators at EU level, in support of environmental integration within the CFP and in the context of international work on indicators. The principal objectives of INDECO are:
>
> 1. to identify quantitative indicators for the impact of fishing on the ecosystem state, functioning and dynamics, as well as indicators for socio-economic factors and for the effectiveness of different management measures;
> 2. to assess the applicability of such indicators; and
> 3. to develop operational models with a view to establishing the relationship between environmental conditions and fishing activities.

At the kick-off meeting in Brussels on 15 December 2004 it was stated by the EU scientific officer responsible for the project that INDECO should lead to the identification of 'robust and operational indicators describing the links between fisheries and environment, applicable across a large range of ecosystems and fishing zones'. These indicators should also be useful as 'communication tools to keep the wider public duly informed'.

The objective of Work Package 6 (WP6) "Socio-economic indicators" is to review and analyse the utility of socio-economic indicators in fisheries management, with reference to the impact of fishing on the environment. On the basis of a strategic review and comparative case-studies (North Sea and Mediterranean Sea), it is intended to understand the existing usage of socio-economic indicators, to identify critical gaps and to make recommendations for future development of appropriate methods and their application. A key aspect of the work will be to broaden the perspective on socio-economic analysis into the key domains of policy development and institutional change (with reference to fisheries management systems), and how this might be brought about by appropriate stakeholder participation and feedback.

There are three main components and deliverables to WP6. The first component (Deliverable No.8) reviews the existing use of socio-economic indicators that have been used to understand the impact of fishing on marine ecosystems. The review focus is on clarifying the conceptualisation of the relationship between natural and social science views of fisheries, and to understand the ways in which natural and social science information has been used and integrated in the past

The second component of the WP6 (Deliverable No. 14a and b) involves two comparative case-studies that will enable an evaluation of the existing utility and future possibilities for the use of socio-economic indicators in the study of the impact of fishing on ecosystem state. The first case-study is on the French Mediterranean Trawler Fleet and the second on the Danish Pelagic Fisheries in the North Sea. The two case-studies have been selected on the criteria (assumption) that they are (comparatively) easily identified at the fishery/metier level, the

political and institutional structure of the two fisheries show important similarities/differences, and the nature of fishing impacts in the different ecosystem types also show important similarities/differences.

The third component of the WP6 (which is the present Deliverable No 18) draws upon the review (D8) and the comparative case-studies (D14a and b) to identify and analyse important gaps in the usage of socio-economic information for the study of fishing impact on ecosystems. The outcome of this analysis is a series of recommendations to increase the utility of socio-economic information through appropriate and innovative methods and their applications with particular attention to the need to broaden the perspective on socio-economic analysis into the key domains of policy development and institutional change and how this might be brought about by appropriate stakeholder participation and feedback.

1.2 The two case studies

The methodological approaches taken in the two cases studies are complementary. The Danish pelagic fisheries case takes the stated international, European and national fishery policy objectives as the starting point and puts focus on the availability and quality of relevant indicator data for a specific fishery The Gulf of Lions trawl fishery case puts focus on adaptation of the Australian ESD framework (see 1.2 below) for state indicators to the European scene and the development of a framework for pressure, driving forces and response indicators. The methodological positioning of the two case studies is illustrated in Figure 1.

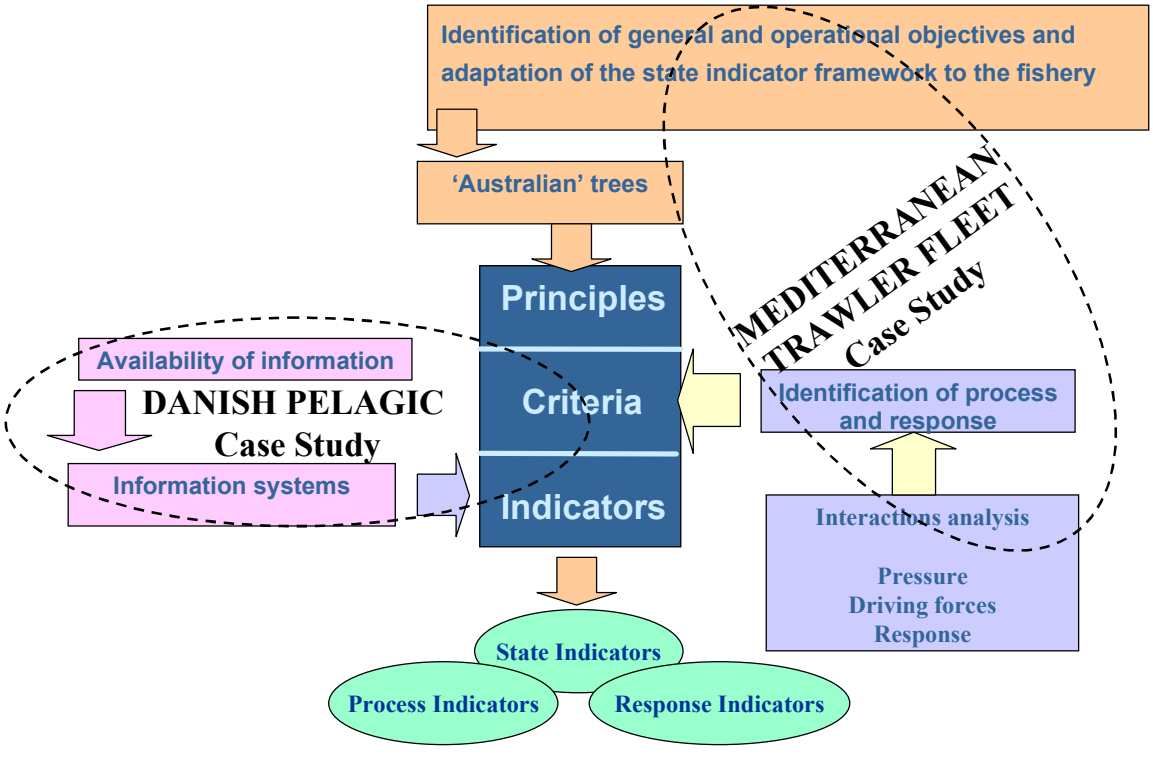

Figure 1 Positioning of the case studies in relation to the overall methodological approach

1.3 Summary of the Methodological Approach

The objectives of INDECO point to three dimensions. They are basically the same dimensions used in the Australian ESD framework (where they are called categories). The dimensions are:

	Dimensions	*Australian ESD framework*
1	Ecological	Contributions of the fishery to ecological well-being
2	Social and economic	Contributions of the fishery to human well-being
3	Institutional	Ability to achieve

The INDECO project adapted the ESD reference framework (see Annex 1) to the EU context to provide a structure to be used to select and organize criteria, indicators and reference points.[1] This entails:

1. Identifying the components under each category. Most of the components identified in the Australian ESD are useable in the INDECO reference framework. However, an EU level component under the socio-economic dimension needs to be included;
2. Deciding on the reporting unit or scale. The Australian framework uses the fishery which is also found appropriate in the EU context.
3. Developing generic component trees to the criteria level. This is necessary in order to have a consistent approach over the different scales (fisheries).

1.4 Evaluation of potential indicators

The development of the generic component trees will lead to the identification of the criteria for which objectives and indicators will be defined or identified. It has been decided to use the FAO standards or norms to evaluate the indicators developed for each criteria. However, for each criteria there will be a need to assess whether the different management levels that indicators have to inform will be covered, namely

1. Strategic level (Evaluation);
2. Operational level (Monitoring); and
3. Communication level

This points to the need for a suite of indicators, some of which are likely to be very specific while others will be highly aggregate. It is also likely that in several situations directions will be used instead of reference levels. The indicator framework to be applied/developed for the European scene is summarized in Table 1.

Table 1 PSR/DPSIR framework and related nature of indicators

PSR	**Pressure**		**State**		**Response**
DPSIR	**Driving force**	**Pressure**	**State**	**Impact**	**Response**
Types of	Indicators related to		Follow-up indicators		Indicators feeding back

[1] This approach has been abandoned as far as ecological indicators are concerned (cf. Deliverable No. 3. Evaluation of Indicators)

indicators	process, behaviours and indicators measuring pressures	of ecosystem and socio-system states	on management measures and management capabilities
Framework to select & develop indicators	To be developed	Adaptation of the Australian ESD trees	To be developed

2 RECOMMENDATIONS FOR RESEARCH

2.1 State Indicators

In the case of the community-regional and national-European trees, a large number of state indicators related to target objectives (and precise criteria) have been identified. At this stage, adding more indicators to the list would not significantly improve the use and the utility of state indicators. Originally, indicators were elaborated per sustainability 'pillar' (environment, economy, social, institutional) as exhaustively as possible. This led to the establishment of long lists of indicators (Rey-Valette *et al*, 2005). However, the state-of-the-art has now moved into a second phase that focus more on indicators at the interaction of the four pillars and with entry related to stakes. This entry enables one to take into account precise objectives related to values and priorities of concerned parties. This approach also leads to the establishment of a shorter list of selected indicators. For example, the French indicators of sustainable development were initially constructed 'per pillars' (2004 report) and proposed 45 indicators, or 5 per pillar. They are now structured per strategic stakes (8 stakes) in order to favour the integration of the different viewpoints (Ayong le Kama, 2006).

The research needed should focus on:

- The identification of relevant stakeholders and the development of the institutional set up for the participative selection of a short list of pertinent indicators per fishery/metier;
- Improving data sets to improve the quality and information contents of the selected/calculated indicators (cf. point 3); and
- Developing a referential to follow up the economic value of ecosystem (cf. point 2.4).

In the case of the good governance tree, there is in particular a research need to refine the phase 1 of the framework. It would lead to the development of a tool for quick assessment of the main key steps of the decision-making process related to a fishery. Then further work would be required on the development of governance indicators related to each of the key steps of the decision making process.

2.2 Pressure and driving force Indicators

Major research remains to be done to develop operational pressure and driving forces Indicators.

2.2.1 Pressure Indicators

Understanding relationships between direct fishing pressure and fishing stocks is the most researched area in relation to the development of indicators of the environmental performance of the CFP. Nonetheless, a lot of questions remains and need to be investigated. Hypotheses

on impacts of direct fishing pressures on ecosystems largely remain to be investigated and tested on concrete case studies

To more precisely link fishing effort with ecosystem state, key issues still require further research work including:

- Availability and reliability of fishing effort indicators (e.g. vessel days at sea, area swept, number of hooks) for specific fisheries/metiers to establish/test hypotheses on the relationships between fishing effort and fishing impacts on the ecosystem;
- Methods to discriminate more precisely between fishing impacts and impacts from other sources even where ecosystem indicators sensitive to fishing are selected;
- Better understanding of time and space scale issues between pressures and responses from the ecosystem.

2.2.2 Driving forces Indicators

Fisheries economics and related theory and models facilitate the identification of a number of generic economic driving forces. Indicators that describe driving forces that either promote or discourage new entries in the fisheries (human capital) and/or new investments (manufactured capital) include:

- economic rent in fisheries;
- level of subvention;
- regional unemployment rate;
- capital lending rate.

Both (entries and investments) are likely to increase the fishing pressure depending on the management system in place.

Systemic analysis applied to fisheries in the 1990's helped to develop a global representation of the fisheries system which inter-linked social, environmental and political aspects. However, the underlying models of linkage between social, economic and political theories needs to be refined to be useable for developing critical driving forces indicators. A multi-disciplinary theoretical model of driving forces identification such as the one presented in Figure 2 needs to be further specified in order to develop diagnostic tools for quick identification of main driving forces pertaining to a specific fishery/metier.

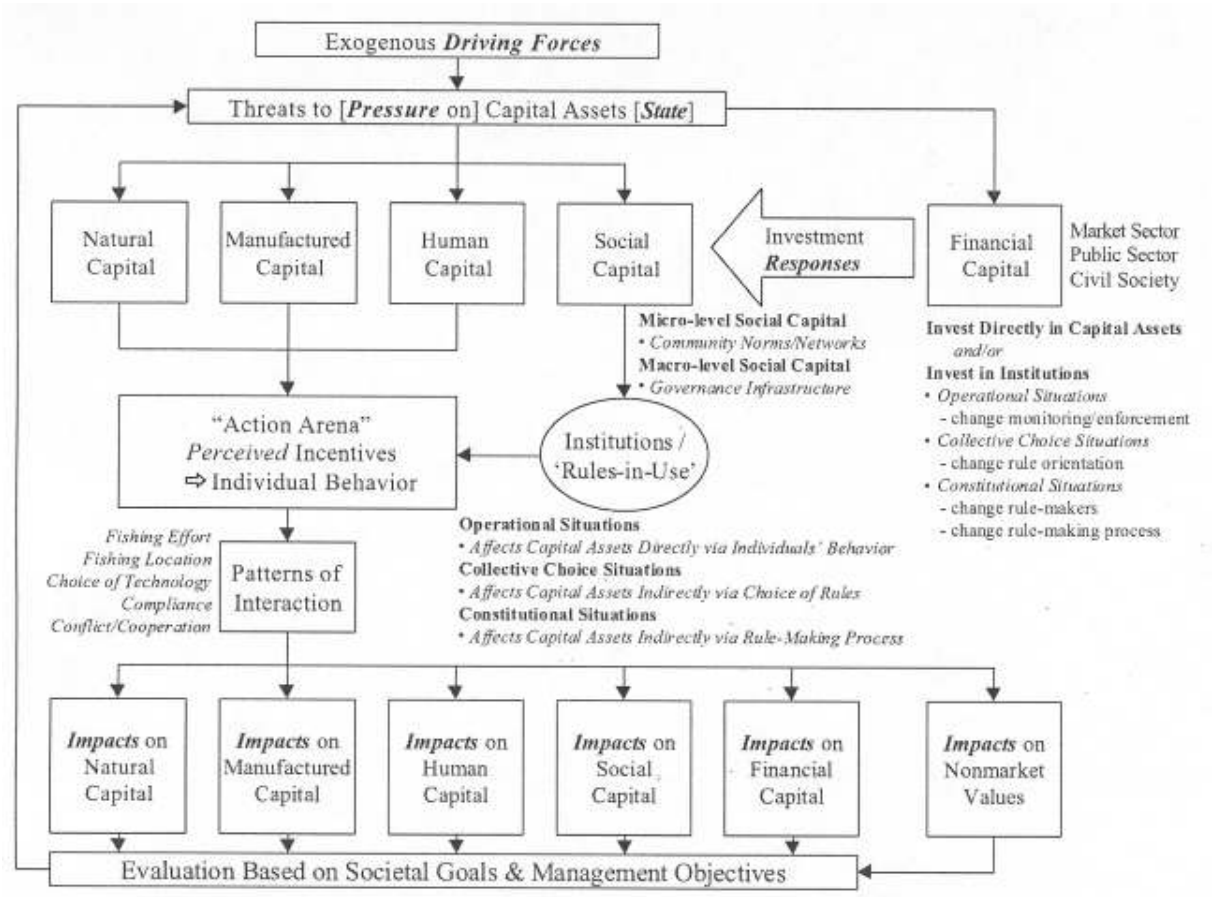

Figure 2 Institutional analysis and Development Framework (Rudd, 2003)

2.3 Response Indicators

Response indicators is a field that largely remains to be developed based on a solid conceptual and theoretical basis beyond the few indicators that have been proposed (mainly on a expert base) in publications (cf. Rey *et al*, 2005 and Bodiguel *et al*, 2006).

Response indicators should be selected in connection with the good governance analysis (governance tree) and the identification of pressures and driving forces indicators. Research related to pertinent response indicators should be multi-disciplinary involving economic, political and social sciences with a special effort made on multi-disciplinary methodology that allows the development of quantified response indicators.

2.4 Economic value of ecosystems

Measurement of an ecosystem value is an answer to the need for evaluation of all the functions and services offered by an ecosystem. Numerous typologies of ecosystems' functions and services have been established: those services can be marketable or not marketable, they can serve present functions or future generations needs (option value). The sum of the components of the economic value of an ecosystem defines the so-called total economic value.

This total economic value is often divided in two categories depending if the calculated value of components are or not related to a usage. The use value represents the economic benefits that can be generated by an ecosystem. The use can be:

- Direct when there is an economic use of a natural component, with or without take away (such as fisheries that induce an active removal of fishing resources) ;
- Indirect when there is functional benefice or contribution from the natural component to an ecosystem's well functioning (such as the role of nursery areas in a fish specie's life cycle).

The value of existence (also called non use value) represents the importance given to a natural component independently from its use. It covers both the value related to the preservation of the component for future generations (legacy value) and the value related to the preservation of the component for itself.

Total economic value		
Use value		**Non use Value**
Real Use Value - Direct - Indirect	Option Value (future uses)	- Legacy Value - Existence Value

The evaluation of non market values requires specific methodologies which often imply extensive field work. The obtained values are thus both calculated (and not measured) and cannot be assessed in a regular follow up system. However, important research efforts in gathering these values are ongoing and will facilitate the establishment of meta-analyses.

A number of global evaluations have been produced and are still used as reference such the one made by Constanza *et al* (1997) for the value of coastal ecosystems (by types of biotopes). This evaluation distinguishes 16 categories of biotopes and 17 functional services generated by the ecosystems. It gives an overall evaluation of services offered by the ecosystems calculated in US dollars per year and per hectare. These reference data were used to evaluate the socio-economic cost and benefits of integrated coastal zone management in the EU demonstration projects (Firm Crichton and University of Strathclyde, 2000). However, it is difficult to deduce from such evaluations, local estimations of values for specific fisheries.

This type of analysis allows attributing a value prior to any observed degradation and make value assessments/measurements in studies of environmental quality of ecosystems. They are also used in cost-benefit analyses to estimate loss and modulate investments and decide on public budgets for initiatives in favour of preservation and/or restoration of ecosystems.

It is thus important to taken into account these types of evaluations, which could, at first, be used as referential. The elaboration of the referential should be the object of specific research related to fishing impact on ecosystems.

Even if those indicators cannot be followed-up on a very regular basis (considering the cost and time required), they are included in state indicators to give a representation of the evolution of economic values attributed to an ecosystem. Those values are a function of the types of exploitation (use value) and the environmental services (which depend on the context and technological state of societies). They are included in the analytical graph, adapted from the Australian ESD framework under the box called "existence value". This box refers to the

existence value of the exploited ecosystem exploited by the considered fisheries and the cultural value related to the fishery itself (economic value of the cultural patrimony[2]).

3 IDENTIFICATION OF GAPS AND NEEDS IN DATA AND INFORMATION

3.1 Application of the Indicator Framework on the Pelagic Case Study

In general the datasets presented for the Danish pelagic fisheries in the North Sea case[3] provide a comprehensive picture of the development of the pelagic fleet segment (metier) over the last 10 years. However, the lack of data directly relevant to the indicators selected in relation to policy objectives (at the international, EU, national levels) proved – not unexpectedly - to be a major issue/constraint.

The difficulties encountered varied by indicator and hence data sets. On a general level it was a recurrent problem that publicly available data on fisheries are not sufficiently detailed to be related to the pelagic segment, as this segment was identified in the case. In Denmark a lot of the fisheries statistics is provided by the length and gear of the fishing vessels in accordance with the data collection Regulation (DCR). However, in the pelagic case some statistics had to be used, which was closely related to DCR but did not quite match the pelagic segment as defined. An example of this is the use of data that are only available by the main production category of 'herring, mackerel and industrial species' for the establishment of economic indicators. This problem can to some extent be overcome by access to primary data. However, in the Danish case such access would not solve the problem completely, as the Danish fishing vessel register is not sufficiently reliable where the registration of the main type of fishing technique is concerned. In principle a vessel owner can change gear the day after having submitted the questionnaire on the most favoured fishing gear. As a consequence of this shortcoming of the vessel register it has not been considered feasible to separate for instance bottom trawl, beam trawl and pelagic trawl in most statistics. This clearly affects the usefulness of the vessel register data.

A main lesson from what is mentioned above is that the identification of a specific fleet segment in terms of the type of fishery/metier/gear use remains a major challenge. This has shown to be the case even if the pelagic segment/metier was selected for the case study particularly because it would seem more manageable in this respect than most other Danish fisheries/metiers.

Another problem encountered is that the time series available were often very short, dating only a few years back. This is in some situations related to changes in the reporting practices, that made older datasets incomparable with more recent data. In some cases the very nature of the change in the accounting practice was not presented in a way that made it possible to determine its implications. A more specific but related problem is the fact that, according to sources in the sector, prevalent forms of wages change over time with changes in management systems, potentially disturbing time series continuously.

In some situations it was difficult to identify how specific datasets were arrived at. This obviously made it difficult to make comparisons with other figures and establish the necessary reliability and validity of the datasets. Some data were simply not available for the fisheries sector at all. This is for instance the situation with data on unemployment, which is not registered for fishers as a professional group in Denmark.

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[2] It covers several type of values: (i) Use value: resource for local development, (ii) legacy value and existence values as cultural reference pour a given community.

[3] INDECO Deliverable No. 14b: Case Study: The Danish Pelagic Fisheries in the North Sea.

However, it is reasonable to think that the majority of the data problems encountered could in principle be overcome for the Danish pelagic sector in isolation. However, it will be a relatively costly endeavour to gather data at the necessary level of detail for all sub-sectors/metiers of the fishing industry which is a sector of limited importance in most areas of Europe. The Danish pelagic case is in the INDECO context presented as an isolated Danish case that does not highlight the problems of comparability across countries in Europe. Comparability of data across countries is an issue, which is potentially even more challenging than the issue of data availability at the national level. This has been confirmed by people working on developing the DCR.

3.2 Short list of selected indicators

To identify gaps and needs related to the calculation of indicators, a short list of selected indicators has been established on an expert basis. State indicators have been primarily selected to be consistent with the recommendations related to needs in research for pressure, driving force and response indicators.

The adaptation of the Australian trees is supported by the following hypothesis: 'the environmental performance of the CFP partly depends on the capability of the system to perform well at the level of the four sustainability pillars : social, economic, environmental and institutional'. The selected indicators are then presented under each of the pillars.

The environmental pillar is covered by the biologists, the three other pillars that relate to the society side of interactions between nature and society are treated in this section.

This indicative list, intentionally short, is based on the cases studies (D14a and b). The indicators were chosen on the following criteria:

- Same or close indicators found in both case studies ;
- Directly measurable indicators: the needed information is available or indicators are available for another purpose and their use can be extended ;
- Indicators of particular interest but still difficult to measure (problem related to the existence or the accessibility of needed data, standardisation issues, etc.).

A reference list, institutionally validated, would require further tests at different scales to conduct specific work on indicator standardisation. Then a reference panel of indicators could be established.

Table 2 Principles and Objectives per sustainable development pillars

Pillars of sustainable development	Principle and follow up indicators
Economy	Measure and follow up the sustainability of the fishery system of exploitation, pointing particularly its economic vulnerability. It includes classical indicators of profitability, productivity and competitivity of productive systems.
Social	Social sustainability implies that development should favour a better quality of life and well-being of populations. Indicators selected in this section are limited to social aspects related to the fishery sector and other population considered as consumers.
Governance	Follow up the institutional capabilities of management institutions to respond to the given problems (in relation to the improvement

	of good governance objectives).

Indicators	North Sea	Med. Sea	Purpose of indicators	Existing or easily accessible Indicators	Information issues
ECONOMY OF FISHING UNITS					
Landings per vessel and / employment	X	X	Measuring of productivity	X	
Prices			Measuring of competitivity	X	
% fuel cost			External dependency and contribution to the effect of green house	X	
Age of vessels			Age of vessel is a factor of sustainability of the fishery in the sense that older vessel generates conditions of exploitation that are not always as competitive (level of equipment, fuel consumption, motors...) or as optimal as far as on board security is concerned (higher risk of injuries).	X	Age of vessel is a data easily accessible but not always representative of the state of a vessel. It does not reflect modernisation efforts or changes in motorization.
Invested Capital			Measuring of financial profitability	X	The diversity of the modalities used across Europe to evaluate the invested capital lowers the capabilities to standardise this indicator. The best indicator would be the insurance value but this data is at this time very

					difficult to access to.
% Subsidies	X		Measuring of profitability	Additional indicators	It is difficult to have an exhaustive state of subventions given to fisheries. They can be indirect or not individualised (e.g. collective equipment). They can be exceptional subvention in case of crisis or not specific to the sector or, at the opposite, specific to one segment or one region. Subvention is thus difficult to identify.
Corrected economic return (economic return calculated without fuel subsidies)		X	This indicators would adjust the picture of competitivity and viability between the different fishing fleets.	Additional indicators	The Economic return is calculated in the Concerted Action on economic performance of selected European fishing fleet (2001-2004). Fuel consumption is also available and enters in the calculation of this indicator. A corrected economic return reintegrating real fuel cost without subsidies is potentially measurable. The main difficulties will come from the heterogeneity of level of subsidies through time, per segment of fleet and/or regions.
Return on investments	X	X	Measuring of financial profitability	Additional indicators	
ECONOMY OF THE FISHING SECTOR					
% added value / GDP			Relative importance of the fisheries sector	X	It would be valuable in a management perspective to calculate this indicator at the regional or local scale, but may be costly.
Foreign trade			Dependency on external production	X	
Economic Resource Rent		X	Rent is an indicator of Sustainable Economic efficiency : - economic efficiency of natural	Additional indicators	The rent is a calculated indicator. It is the difference between the revenue and total cost. It can be calculated without the management cost but ideally, it these costs

			resource usage (ratio between the current economic rent and the potential resource rent) and, - economic sustainability of natural resource usage because the optimum economic potential in terms of level of exploitation is almost always situated below the biological optimum. This type of indicator is particularly pertinent in term of sustainable management.		should be integrated. A specific effort to measure management cost is specifically required (cf also the section on cost of regulations and D8, in particular the section on institutional indicators).
SOCIAL ISSUES RELATED TO THE FISHING SECTOR					
Number of fishermen	X	X	Measuring of employment	X	For a number of fisheries a potentially significant level of informal employment exists (not declared) which is difficult to evaluate. It is also necessary to take into consideration forms of multi activities that can be important in certain fisheries (e.g. small scale fisheries).
Number of unemployed	X	X	Measure on the level of pressure to enter the fisheries sector	X	The main issue is related to comparison of unemployment statistics across countries dependant on counting modalities. Furthermor, it is not necessarily the case that the number of unemployed fishermen is available at all. This is for instance the case in DK where there is fishermen's union but a seamens' union. The rate of unemployment among those who consider themselves fishermen is thus unknown.

Wages	X		Distribution of revenues from fishing		Some problems arise when calculating this indicator: - Differences of forms of wage across EU countries ; - Premium or non salary revenue considered or non in the revenue - Prevalent forms of wages change ove r time with changes in management systems, potentially disrupting time series.
% informal employment (not declared)			Social security cover of employment		
% Wages / Added value		X	Equity of repartition at the enterprise level		It is in certain cases difficult to establish the level of revenue because an important part of the revenue is distributed as a premium.
Age of vessels			Risk of vessel accidents and injuries		
Age of fishermen			Level of fishermen 'recruitment' and state of the community.		
Number of women			Measurement of women participation in the fishing enterprises and access to social security cover		
Work injuries	X	X		?	Systematic census of injuries per level of gravity is lacking
SOCIAL ISSUES RELATED TO CONSUMERS					
% consumption and	X		Consumer access to fish product		

transformation					
Traceability of fish product	X	X	Impact on consumer health		Information may be available but not registered in a centralised manner
Quality (level of heavy metals)			Impact on consumer health		There are no systematic at stock or fishery levels data
Relative fish price (variation of fish price/ variation of retail price index)		X	Access to fish product.		This indicator would give the trend of fish price compared to other consumables. Using a national retail price index would be more pertinent to asses the economic access to fish at citizen level. This indicator gives general information on economic access, but does not discriminate the origin of fish consumed.
GOVERNANCE					
Market take-out by POs	X		This indicator gives an idea of the level of organisation of the sector. As such it contributes to inform on the management capabilities.		Data are available per species but not always per fishing unit. Both components would be interesting to follow up. However one must realise that it can be more difficult in the case of mixed fishing units.
Violations of regulation	X	X	This is an indicator of *management efficiency* which is assessed on the basis of management success at reaching its goals.	X	A number of violations of CFP rules are followed by the EU (CFP Compliance Scoreboard)
Cost of management			This is an indicator of *decision-making efficiency* which is related to the degree to which policy		The evaluation of public budget spent is often the major component of management cost analysis. However to measure the total cost, cost related to policy

			process are timely delivered and adapted to their objectives.		implementation should be added, what integrates (i) cost related to salaries and functioning of state services and communities but also (ii) cost related to research and follow up activities directly related to management functions and decisions. These elements are not easily delimited. It can be noted as an example that the OCDE (2003) analysis which integrates the cost of management institutions. In this study, public management policies' costs are estimated at around 2.5 millions US$ for the OECD countries (36% of public transfer to the fishery sector), relatively equally shared between enforcement (39.6%), research (34%) and strictly management (26.4%) (cf. Rey-Valette et al, 2005)
Amount of Subsidies	X		Support to the sector		This is part of the preceding indicators
Number of fishermen in local institutions			Local representation of the sector		Data are not collected at this time.
Number of women in agencies/institutions/organisations in charge of fishery management			Equal opportunities		Data are not collected at this time.
Diffusion of information by management			Transparancy and access of information (cf. Aarhus Convention)		Appropriate qualitative indicators need to be built

agencies (web sites, observatories…)					

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ANNEX 1

Australia's ESD framework[4]

All Australian fisheries agencies and industry groups are committed to implementing the principles of ESD (Ecologically Sustainable Development). ESD recognises the need to integrate the short and long-term economic and social and environmental aspects of activities. It is now enshrined in most fisheries legislation in Australia. Strong support to develop the ESD was received from all stakeholders groups.

The basic reporting unit is a fishery, as defined by the management agency. The framework is designed to document a fishery's contribution to ESD - where ESD is defined as:

> *'Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.'*

ESD has been divided into eight major components relevant to fisheries, which can be grouped in three categories:

Contributions of the fishery to ecological well-being

- Retained species
- Non-retained species
- General Ecosystem

Contributions of the fishery to human well-being

- Indigenous well-being
- Local and regional well-being
- National social and economic well-being

Ability to Achieve

- Governance
- Impact of the environment on the fishery

These eight components are further sub-divided into more specific sub-components, using a 'component tree' structure for which specific objectives and subsequently indicators may be developed.The generic component trees associated with the eight components are to be tailored to suit the particular circumstances of each fishery to which ESD reporting is applied, expanding some sub-components and collapsing or removing others.

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[4] The Annex is based on the ESD website (http://www.fisheries-esd.com/c/home/index.cfm) and on Fletcher, W.J., Chesson,J. FisherM., Sainsbury K.J., Hundloe T., Smith A.D.M. and Witworth B. (2002): National ESD Reporting Framework for Australian Fisheries: The 'How To' Guide for Wild Capture Fisheries. FRDC Project 2000/145, Canberra, Australia..

For each of the lowest level of sub-components, a risk assessment is then carried out, in order to determine the appropriate level of management response and monitoring required, and what complexity of report needs to be written.

If an issue is of sufficient risk to require specific management, a performance report must be produced. These reports must include:

1. an operational objective for the particular sub-component;
2. an indicator; and
3. the levels where performance will be viewed as acceptable with respect to the operational objective.

In addition, the management responses necessary to achieve acceptable performance are required to be listed in the reports.

Where data are already available, the report must include a graph of the performance indicator over time. Where data are not available, the report must describe the process that is necessary to be undertaken to obtain them.

The report provides the framework to determine if the proposed management actions are appropriate, given the levels of risk and current knowledge (i.e. give justification for the actions).

The reporting method differs from ‘top-down’ fisheries reporting approaches, where a set of indicators and performance measures is imposed on all fisheries without regard to their individual circumstances.